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ABSTRACT

The approach of the University of California at Berkeley to policies and planning of administrative data processing systems, specifically, the transition from centrally-planned and implemented administrative information systems to user planned systems is examined. In analyzing the history of this change both the philosophy and the mechanisms used to accomplish it are discussed. A system installed in the University's Office of Admissions and Records under the central concept is contrasted with the prospects for systems under the new policy. (Author)

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A User's View of an Administrative Information Needs Assessment Process

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The Office of Admissions and Records (OAR) on the Berkeley campus of the University of California directly effects all members of the campus community including students, faculty, and administrators. Its areas of responsibility include undergraduate admissions, registration, class enrollment, grade processing, degree checking, transcript production for graduates and undergraduates, and the scheduling and locating of all classes. In carrying out these tasks, the office interfaces daily with other campus units such as the Financial Aid Office and Graudate Division. In order to accomplish these tasks OAR has become a substantial user of data processing systems.

This paper will examine, from OAR's perspective, the University's approach to policies and planning of administrative data processing systems, specifically, the transition from centrally planned and implemented administrative information systems to user planned systems. In analyzing the history of this change both the philosophy and the mechanisms used to accomplish it will be discussed. A system installed in OAR under the central concept will be contrasted with the prospects for systems under the new policy. First, to understand the situation in OAR, it must be seen against the background of the University as a whole.

The University of California is an institution of immense diversity. It is located on nine campuses scattered throughout the state, varying in size from Riverside with 4800 students to UCLA with over 30,000. The programs offered vary as widely as the size. These environmental differ[illegible]es are

compounded when such considerations as organization, management styles and priorities are included. Academic excellence, the hallmark of this institution, is engendered by relative campus autonomy. Administrative complexity, however, is also a result. Each of the nine fairly separate entities (including the UC Medical School in San Francisco) is responsible to the Systemwide Administration, the Board of Regents, and the State legislature.

In 1963 then University President Clark Kerr moved to centralize responsibility for administrative data processing in the Office of the Vice President--Finance. In the ensuing years a department at the Systemwide level was established and grew in an attempt to meet these responsibilities. By 1970, however, the new President, Charles Hitch, found less centralization than he thought desirable. In an effort to reduce spending on data processing he issued a strong restatement of the University's position: "to achieve, wherever feasible, a single system solution which meets the needs of those who share a common problem, to coordinate development efforts so that they do not overlap nor compete with efforts on other campuses and within the Office of the President, and to establish an effective technique for determining the priority needs of the University in total." In an effort to further strengthen this approach a Common System Fund was subsequently established by an annual assessment of each campus.

The objective was to prevent duplication and provide for the efficient use of machine facilities. Clearly this is a laudable goal, especially so in the early 1970's when higher education was experiencing declining enrollment and reduced funding. Also, the climate in the California State government at this time was one of increasing criticism of the University's finances. It is on this criteria of efficiency and cost saving that this policy must be judged.

URIS: A Common System

Back in 1963 when President Kerr was attempting to centralize data processing functions, the Los Angeles campus began to implement the first all-encompassing registration "system" (a big step up from the simple punched card system then in use). It was subsequently adopted by two smaller campuses (Davis and Riverside). This system was called the University Registration System (URS) as it related solely to the functions of the registrars. Coded data for a student first entered automated operations with the creation of Registration and Study Packets and went on to a reconciliation of fee payment, enrollment in classes (still via cards though the results were placed on tape), production of various registration and student performance reports, rosters and statistics, record maintenance edits and listings. Finally, each term a complete Student Record Card in up to six copies was produced. Upon the opening of the Santa Cruz, Irvine, and San Diego campuses, the system served six of the eight general campuses.

For the early to mid-sixties this was clearly an ambitious system. There were, of course, several other institutions in the country making progress in similar areas of student records (admissions, alumni, etc.) and a few were also attempting to produce the student's entire transcript. Although some of these systems were more complex in individual areas, none approached the University Registration System in number or variety of products.

In 1969, following the common systems philosophy, the Regents of the University funded the creation of a Management Information System to encompass personnel, payroll, budgeting, all aspects of the various accounting operations, space utilization, and student records. This was to be a total system for management information needs. For OAR in Berkeley (and Santa Barbara) this meant joining URS--now known as URIS (University Registrars Information

System). This would enable Systemwide management to obtain comparable data from each campus. Everyone was to use the same definitions, codes, formats, cycles and reports.

There was very little support for this move on the Berkeley campus. The campus' data processing office was opposed to it, as was OAR. They did not believe that a system designed almost ten years before for second generation equipment would work at Berkeley. URIS, they argued, is a batch processing oriented, sequential file system and is primarily a reporting system that does not support local operational needs. On smaller and newer campuses (i.e., Irvine and Riverside) independent registration systems had been developed to meet their own needs. These systems fed into URIS which was used only to meet the demands of Systemwide for common reporting. These arguments were not well received at Systemwide and in 1972 Berkeley was ordered onto URIS. Planning was begun with the goal of full operation in 1977.

The problems became apparent early in this planning process. When URIS was newly invented at UCLA there was no concept of common data; now this was the major goal of the system. However, because of the diversity of the University, conflicts were inevitable. Each campus requires special codes for their unique programs and situations, but this ten-year-old system just does not have the flexibility to accomodate all these demands. The addition of Berkeley's nearly 30,000 students was the "straw that broke the camel's back". Limitations on what could and could not be done had to be made. A committee of users from all the campuses was established to set the basic guidelines. According to the best democratic tradition, each campus had one vote. Situations soon arose where the needs of one or a few campuses had to be voted down to further the common "good." One example will suffice to make this clear. Berkeley is the only campus with a School of Optometry, a six-year undergraduate program

(although for statistical and state aid purposes these students are counted as graduate students during their last two years). URIS has only two categories, however--undergraduates and graduates. This created a real dilemma which had to be "solved" by creating dummy files on these students.

Berkeley's predictions of trouble with URIS have come true now that the system is in use. URIS as a reporting system, rather than an operating system, does not support registration and enrollment. URIS files on individual students are established with information received from the Undergraduate Admissions System, the Graduate Admissions System, and the processes of registration and enrollment. That is, URIS files are not created until information is received from the admissions system indicating that a student is eligible and intends to enroll. The files are later supplemented by information received as registration and enrollment are completed.

Grade changes demonstrate the problems of the labor-intensive URIS requirements. Several thousand grade changes are received each year in OAR. They are first reviewed for proper signatures and complete information. Clerks then locate the appropriate manual record card, post the changes, manually re-calculate the grade-point-average correct it on the card, which must then be refiled. The URIS transaction form must then be prepared, forwarded to key entry, processed, and returned. Error/ edit lists are run, and must be checked and corrected. Finally, the URIS file is updated. One more check is necessary, at the end of the quarter to make sure the changes have been made correctly. It is easy to see that the data may be in error for weeks or months before corrections are made. These are operational problems; it must be remembered that URIS's main benefit was to be as a reporting system.

On the UC Berkeley campus, there are approximately 29,000 undergraduate and graduate students and 3,200 instructors, including teaching assistants and

fellows. Each quarter 5,600 courses are taught in several hundred classrooms and laboratories. Assignment of laboratory space is the responsibility of the 87 academic departments. Classroom and auditorium space is assigned by the Scheduling Section of OAR. This space must be allocated not only for teaching purposes, but also for numerous meetings and other extracurricular activities throughout the year. The Scheduling Section coordinates publication of the printed Schedule and Classes for each quarter and preparation of class cards required for the enrollment procedure. The Data System of Instructional Resources (DSIR) is primarily a reporting vehicle for Systemwide Administration and the California State Legislature. This system tallies instruction hours for the teaching staff, relying heavily upon data controlled by the Scheduling Section of OAR and additional data supplied by departments.

OAR must keep track of 100,000 individual enrollments in 9,000 sections, each of which meets from three to five hours per week. The enormity of this responsibility should be clearly understood. Student records, instructor utilization, and state funding for instructional programs depend upon the accuracy of this data. Add to this the fact that Berkeley operates on a ten-week quarter system with its pressing time constraints, and the necessity for tight controls within OAR becomes apparent.

Classes are scheduled and spaces assigned manually. Appropriate data is entered by batch method in the Class Master File, the only automated form of schedule maintenance, from which the printed Schedule and Classes is produced. The Class Master File is maintained in URIS. The system returns some listings, including a conflict listing, used by Scheduling, but all updates are entered by hand on the paper copy, since turn-around time for computer generated lists is so long that the section cannot wait for them. As with any batch system, there is an excess of paper handling (in this case caused by the switch to the

URIS system). It has been necessary to add three employees to handle the increased workload.

Study list filing and the major part of the add/drop procedure are concluded at the end of the third week of classes. Enrollment data as of that time is entered on the URIS file which then generates one listing for DSIR, usually during the seventh week of classes. Enrollment data for the current quarter is constantly updated to assure accurate record information, while subsequent quarters' files are being built and maintained simultaneously. Final adjustment of enrollment figures and instructional hours have been continuing, meanwhile, between the departments and the Scheduling Section, but all subsequent updates to the DSIR report must be done by hand from information received directly from the departments. The Scheduling Section may have already made the same corrections to their records and to the URIS file, but DSIR no longer has access to URIS information. DSIR staff must also submit their corrections for key entry and processing. At present, they send their forms to a key entry vendor in another city. The staff is never certain their updates will be made according to schedule, because the vendor frequently is unable to submit tapes on time. (OAR, with only keypunch equipment, cannot perform this service for DSIR since it requires 128-character records.) This cumbersome situation frequently results in final DSIR reports being delayed several months while the campus Chancellor, University President, and state officials wait.

The whole system is frustrating for the staff, campus and Systemwide management, and State administrators. For fiscal year 1977-78 OAR is conservatively estimating the additional cost of URIS to be $100,000 (salary for the extra clerical support needed because of the additional paper work). This dollar amount only reflects part of the cost. The greatest price has been

paid in human terms. Personal and organizational relationships have been strained; jobs have been made harder and more time consuming; the number of errors in student records has increased. Adding Berkeley to the common system caused that system to become unwieldy; so it has lost its logic and integrity

The Movement to User Planned Systems

While Berkeley was completing its plan to join the common system a new University president was taking office. In December, 1975, President Saxon established a task force to study the management information systems of the University. The eight members included faculty, administrators and data processing professionals. Their cahrge was broad--to review "the status of management systems and data in the University" and to recommend "an approach to policies and planning" of these systems.

To meet this responsibility the task force adopted a plan of "top down" analysis. They began by asking the question "What basic information do the President, the Chancellors, and their key deputies believe must be systematically collected and displayed to meet their individual and collective responsibilities to The Regents, external agencies and internal constituencies?" To answer this question they interviewed seventy top University officials, on the campuses and at Systemwide Administration. Their questions focused on five areas: responsibility, organizational relationships, current problems, anticipated changes, and information needs. With regard to this latter category, a particular effort was made to establish how the existing systems met the administrator's needs.

The task force found extensive use of data processing systems. In general, however, there was a lack of satisfaction with performance. Specific findings included: 1) inaccuracies in some data and overemphasis on accuracy in other data; 2) difficulty in utilizing data because it did not meet needs or was

inaccessible; 3) variation of campus capability for developing, operating, and using administrative information systems. The task force was unable to uncover any study which indicated the cost effectiveness of the common system approach. In fact, they found that campuses were forced into using systems without regard for compliance costs.

The results of this study have had a substantial impact on the organization and priorities of administrative data processing. Ten specific recommendations were made, the most important of which was to radically change the prevailing information systems policy (see Table 1). The task force's interviews revealed a fatal flaw in the common systems approach--the information needs of the campuses and systemwide are not common: common systems--to often unwieldy, inflexible and costly--have been developed as compromises which serve no user's needs especially well. The remaining nine recommendations are concerned with establishing a new policy that would allow for each campus to eatablish its own systems priorities. The role of Systemwide would be that of a coordinator, promoting cooperative uniform systems. The responsibility would be at the campus level for developing systems that meet individual needs along with the reporting needs.

The recommendations of the report were accepted. President Saxon suspended the common systems policy, and plans were made to transfer major portions of the existing computer systems to the campuses. This put the campuses in a position to design and implement modern data-base oriented systems to service major segments of the administrative process not previously served.

The first step in the assumption of these new responsibilities by the campuses was the Needs Assessment Phase of the project. This was to be done on each campus independently at the beginning of the planning process. A basic plan was recommended by Systemwide to guide the study. The approach

Table 1

Task Force Recommendations

1. Change current informations systems policy
2. Establish a new organizational structure for information systems within Systemwide Administration
3. Develop a University Information Systems Plan to meet needs for information
4. Reduce the impact of internal and external reporting
5. Define needs for administrative information
6. Establish uniform definitions of data elements
7. Establish recharge policy
8. Distribute data preparation and editing
9. Improve accessibility and utility of existing data files
10. Promote cooperative systems development

used was a modification of the IBM Business Planning Methodology. Initially it was thought this project should be under the direction of Systemwide data processing. Work groups were established but after a few meetings it became apparent that they were improperly constituted. Responsibility was transferred to the campuses.

Needs assessment can be carried out at many different levels. The Administrative Information Systems Task Force operated at the most general level. It identified some of the overall problems, and suggested avenues of improvement. The individual campus level needs assessment project, however, operated on a more detailed level. This step was designed to establish the ideal flow of information among the major functions in the University, and to allow for the development of a systems goal that supports the flow of information (see Table 2). Part of this step was the comparison of this system's goal and the existing systems. This comparison, along with other factors, helped indicate systems which have high priority and high payoff for systems development. This was not, however, meant to be a planning phase; planning is more finely refined step in the overall needs assessment.

The project was organized in several distinct phases. Step one was initiation of the project. On the Berkeley campus the Chancellor appointed a Steering Committee. Its members were drawn from the ranks of both users and data processors, and was chaired by the Vice Chancellor. Responsibilities of the Steering Committee include approval of the project description, review of the list of units and persons to be interviewed, coordination and supervision of the project as it proceeds, and review of the final report.

Concurrently "User Groups" were established. These groups were composed of senior unit managers with appropriate experience in four designated functional administrative areas: Student, Financial, Planning and Analytical, and

Table 2

Objectives of Needs Assessment

1. To identify the logical flow of information required for the campuses, Systemwide Administration, and the University as a whole.

2. To develop a conceptual goal of systems that support the logical information flow required.

3. To identify the most urgent functional areas in the University that require systems support and to explore options of meeting the needs.

4. To initiate an information planning process that encourages cooperative and efficient system development in the University.

5. To develop a solid requirement base, as stated by management and users, for systems development and computer planning.

6. To give users and management a mechanism for measuring the performance of systems they are developing.

7. To encourage the development of systems that serve the entire organization in addition to a specific functional area.

External Relations. The group members were to act as advisers to the Steering Committee. Each group was chaired by a Steering Committee Member. These groups are to remain as permanent bodies to review continuing administrative data processing priorities. Also during this initial phase, the actual project team was organized. It consisted of two Senior Systems Analysts, one of whom acted as project leader. It was estimated this project would be completed in four and one-half months.

Planning was then begun for the next step, data gathering. Approximately 90 campus administrators and officers were selected to be interviewed (by the end of the project, this number had expanded to 106). They were campus officers, heads of representative academic and administrative units, and representative faculty members. To assist the project team four student assistants were hired to help take notes during interviews, and to prepare the subsequent report.

Interviews began after approximately three months of advance preparation. Each interview took from one to two hours, starting with a brief discussion of the interviewee's organization, its administrative objectives, responsibilities, size, and structure. The second part of the interview was keyed to data requirements (see Table 3), which were discussed in terms of broad pre-defined data categories. There were six major classes of data: Student, Curriculum, Personnel, Financial, Facilities/Material, and External Relations. Within each class three to eleven sub-classes were broken out, totalling 49. For example under Student Class Data, there were Personal, Demographic, Financial Aid, Current Enrollment, Academic History, Placement/Post-Grad, Secondary Education, Awards/Honors, and Test Scores. The data requirement questions (Table 3) were asked for each of these sub-classes. The interview was concluded with some general questions designed to summarize the data.

Table 3

Data Requirement Questions for Each Data Subclass

A. Relating to current data requirements and usage:

1. Do you create, maintain/change or use it in detail or summary forms?

2. Is it related to an existing computer system? Which one?

3. Describe: For what or whom the data is used, and what circumstances for them.

   How it is used.

   How often it is used in your operational cycle.

   Its approximate volume.

   The accuracy necessary for your operation.

4. Do you send the data to another (other) office(s)? Please describe the process.

5. Do you receive the data from another (other) office(s)? Describe.

B. Relating to your desires for support of your needs in terms of a one-to five-year goal

1. will you still want/need to create, maintain, or use the data?

2. Should it be in an improved or new computer system?

3. Is there another office which should create or maintain the data? Please describe the process.

4. How does this goal relate to your responsibilities?

5. Is your priority for this goal--critical, secondary, helpful?

Reports of each interview were written according to a standard format to facilitate later compilation of the data. The reports were sent to the interview subject for approval/correction first. Subsequently they were sent to the appropriate User Group for review. Reports of lower level management were reviewed during interviews with senior managers. Although this process of interviewing took somewhat longer than planned, it has now been completed on the Berkeley campus, and the final project report has been prepaid and approved.

In general the Needs Assessment Project found that most campus administrative funcions are serviced by computer based systems for processing some administrative data. In reality, the survey showed that none of these systems (except a very few independent, self-developed ones) are considered adequate for contemporary administrative requirements.

There are serious and consistent problems with existing primary administrative systems. The files are difficult (or impossible) to use for special purposes or reports; it often takes weeks or months. Necessary standard data is often not in the files. New data elements are difficult or cannot be added, and standard updating and reporting cycles are frequently insufficient for current needs. Data from one system usually cannot be used with another. Some of the data in certain systems is unpredictably, but regularly, inaccurate.

Although specific recommendations were outside the scope of this project, guidelines for the next phase, Planning, were provided. They are as follows:

- Provide a standard administrative mechanism for on going needs assessment and evolution of the campus administrative information system plan.
- Publish procedures that provide guidelines for requesting information systems services or initiating administrative systems projects.
- Establish procedures and guidelines consistent with laws regarding the privacy and security of administrative data and information.

- Establish a campus information systems newsletter (or other systematic sharing) for departments and administrators covering topics of gemeral campus interest.

- Establish a campus priority classification plan for systems projects.

- Communicate to campus officers and managers that the planning project is a separate effort which is in parallel with existing systems development projects. All previous systems plans and commitments are still in place.

- Utilize the broad administrative and major functional categories of needs assessment as the initial basis for establishing separate functional administrative information systems and data bases in the campus conceptual information systems plan.

- Initiate a campus financial systems planning project as soon as feasible. Systems in all administrative functional areas generate or use financial data. Current central systems were officially declared inadequate ten years ago and the preponderance of needs assessment interviewees declared financial problems as most urgent. Early plans and guidelines regarding overall financial systems are important for final development of practical, integrated systems in every area.

- Initiate a campus student systems planning project as soon as practicable. Student data is used by administrators and departments in every functional area. Existing systems are currently and potentially inadequate. Major new student systems are considered most urgent by academic and administrative officers and managers at every campus operational and management level.

- Establish a data retrieval project to analyze the costs, benefits, and technical feasibility of making existing systems data easily available and useful to offices that need it.

- Expedite the current analysis and design effort for departmental accounting systems.

The next step is the Planning phase of the project. It is just now underway. A plan for carrying out this process is being made for the approval of the Steering Committee. It will include the development of an Information Systems Model for the campus. Within this model specific development projects will be identified and short and long range priorities will be set. This model and there priorities are also subject to user review.

Conclusion

The University of California has entered a period of major change in its administrative information systems effort. A shift in philosophy from a common systems approach with Systemwide Administration setting priorities and making development plans, to a cooperative approach has occured. Cooperation is not only between Systemwide and the campus, but also between campus data processing and the users.

For the Office of Admissions and Records this philosophical conversion does not change the immediate need to cope with URIS. In the long run, however, it will enable OAR to adapt URIS to its special situation. In the meantime, OAR using its own data processing staff will go ahead with development of a new operating system using a mini computer.